

Assessment Toolbox

MATH GRADES 6-8

North American Division
Adventist Education



Adventist Education
A JOURNEY TO EXCELLENCE

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Introduction to Assessment

Assessment provides instruction and learning feedback to teachers and students. Information gained through informal assessments provides opportunities for teachers to make adjustments to the ways in which they deliver instruction. Teachers use assessments both to provide **feedback** to students about their progress and to **guide decisions** about next steps in the learning process, thereby closing the gap between the learner's current and desired states. Popham (2008) defines formative

assessment as “a planned process in which teachers or students use assessment-based evidence to adjust what they are currently doing”. The operative word in this definition is process, in that formative assessment happens throughout the learning, as opposed to summative assessment, which is often a one-time event that occurs at the end of a learning unit and is used to make judgments about student competence.

This toolbox is designed to provide strategies and resources that support assessment practices in math for grades 6-8.

<http://oea.dpi.wi.gov/files/oea/pdf/activity2el-menu.pdf>

This list is a starting point for your discussion on how to balance the assessment system. If you choose to use this menu, keep in mind that your group does not have to make a decision in every box. These are only suggestions. “Other” is always an option.

<http://www.youtube.com/watch?v=rL54bfmZPzY>

Welcome to REAL formative assessment! Measured Progress has created a DVD program that explores how REAL teachers implement REAL formative assessment in their classrooms. This clip documents teachers use of techniques and tools to bring about gains in student learning.

<http://michelledriskell.blogspot.com/2011/09/formative-assessment-in-first-grade.html>

This is a blog of a first grade teacher. She provides a definition of formative assessment, gives some ideas of strategies to use, and provides examples and excerpts from her first grade classroom. The blog also provides the opportunity for dialogue with other teachers regarding the use of assessment.

<http://www.youtube.com/watch?v=B3HRvFsZHoo>

Dylan Wiliam stresses the importance of assessment as a key process for increasing teacher quality whilst having the biggest impact on student outcomes. He looks at some of the popular initiatives that aim to increase student achievement, such as learning styles, and presents research that shows assessment practices have a much greater impact on educational achievement than most other reforms.

<http://www.youtube.com/watch?v=dxAXJEK--qk>

Kim Slusher uses assessment as a barometer of student learning in a multi-age primary classroom at Norton Elementary in Jefferson County.

<http://www.youtube.com/watch?v=rL54bfmZPzY>

the Formative classroom (Middle grade classroom used as example)

<http://www.youtube.com/watch?NR=1&v=jzWraXa2qFO&feature=fvwp>

Summative vs. formative assessment



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Assessment Strategy: Journal Entries

DEFINITION:

Journal writing in math is similar to journal writing in Language Arts. The students write in response to prompts what they learned in the concepts taught. Teachers can make it fun by having the students e.g., pretend they are writing a letter to tell a friend what they learned, understood or not understood, how they can use what they learned or if they already use the information but wasn't aware that they were doing so etc.

STRATEGIES:

First, the student needs a place to write. This can be a folder with paper or a spiral.

Next, the teacher must model math writing in a journal. Model how you think and write it down. Do this several times. Then do this with the students and share thinking (orally) and write it down. Then after doing this several times, ask students to answer a simple question. What did you do today in math? Walk around & give them a smiley face or something to show you read their response. If you are unsure if they are understanding the concept, ask them questions to help clarify what they are writing about. At the beginning of this math writing make students write at least 20 words even if they repeat their first sentence. You may want to discuss the question with the class first so the ideas will flow better when they are writing.

Then, have students share their writing with a partner. After several times of this, you may want to have them share with the class.

Last, have your students make up prompts to add to the list.



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Assessment Strategy: Class Discussions

DEFINITION:

It is essential that students have the opportunity to discuss mathematics with one another, refining and critiquing each other's ideas and understandings. Communication can occur through paired work, small group work, or class presentations.

STRATEGIES:

Card Sorts: This is a sorting activity in which students collaboratively sort a set of cards with pictures, numbers, symbols, or words according to a specific characteristic or category. Students sort the cards based on their preexisting knowledge about the concept of procedure. As students sort the cards, they discuss their reasons for placing each card into a designated group.

Strategy Design: Card sorts are best used in small groups to encourage students to share their thinking with their peers. Prepare sets of cards that align with the content goal of the lesson or cluster of lessons students will encounter. Examine research on student learning in order to identify common errors and misconceptions that may be used as examples on the cards. Provide students with category headings under which to sort their cards. Encourage students to lay out the cards in a row or column under the category header rather than item. Have students work in small groups to discuss each card and come to a common agreement on which category to place it in.

Traffic Light Cards: This is a monitoring strategy that can be used at any time during instruction to help the teacher gauge the extent of student understanding; this, in turn, can inform the pace of instruction. The colors indicate whether students have full, partial, or minimal to no understanding. When students are asked to hold up the card that best represents their current level of understanding, the teacher can get a quick snapshot of the class as well as individual students' level of understanding. If the majority of students hold up red, this is a clear indication to the teacher that instruction needs to be modified in order to accommodate the needs of the class. A majority of greens indicates that most of the class is ready to move on. A mixture of colors indicates the need to provide peer and teacher support before moving on.

Strategy Design: Cut red, yellow and green squares out of card stock. Provide each student with a set to keep in his or her desk, the inside flap of a notebook, or other accessible area. When the teacher knows the traffic cards will be used in a lesson, students are asked to put them on their desk. When the teacher decides on the right moment to get feedback from students on their understanding, students are asked to hold up the card that represents how well they feel they understand what they have been doing or learning thus far.



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Assessment Strategy: Written Assessments

DEFINITION:

In this strategy, students have to engage in some form of writing, little or much as a reinforcement to the concepts introduced by the teacher. There are several strategies that can be categorized as writing assignments.

STRATEGIES:

Attainment Cards: This strategy encourages students to develop their own definition of a concept by examining labeled cards showing examples and nonexamples of a concept. By comparing and contrasting various characteristics and attributes of the examples and nonexamples provided, students identify the defining features of the concept and apply those features to create a definition and additional examples and nonexamples.

Strategy Design: Students are asked to think about what they previously learned about a concept, examine labeled examples and nonexamples, and provide a supporting rule or operational definition for the concept. First, identify the concept or mathematical term for which you want to determine how well students are able to generate a rule or definition. Develop a list of examples and nonexamples for each of the various defining characteristics and attributes. Present the examples and nonexamples on individual cards so students can sort as needed.

Create a Problem: This is a reverse problem-solving strategy. Instead of performing the computation, students are given the solution and are asked to figure out what the real-world problem might be.

Strategy Design: Create a Problem can be designed using basic computational problems or more complex problem-solving tasks. Choose a mathematical equation and have students work backwards from the end result to what they think the initial problem could be e.g., the teacher might give students the equation $\frac{2}{3}$ of $15=10$. Students are asked to come up with problems that may have been solved with this equation. Example: John's mother gave him \$15 to spend at the fair. She told him he could only spend $\frac{2}{3}$ of it on rides. How much money could John spend on the rides?

Odd One Out: Odd one Out combines seemingly similar items and challenges students to choose which item in the group does not belong. Students are asked to justify their reason for selecting the number, symbol, representation, or mathematical term that does not fit with the others.

Strategy Design: Select items that lend themselves to a grouping where one item justifiably does not fit with the others. Be sure to choose items and a relationship that is not immediately obvious in order to promote deeper thinking. Provide the list as a handout, overhead projection, chart, or set of cards. Have students record their own answers and thinking before discussing their ideas with a partner or in small groups.

Pass the Problem: This strategy provides an opportunity for students to collaborate in activating their own ideas and examining other students' thinking. Students begin by working together in pairs to respond to a problem, partially completing a solution to the problem. When the time is up, they exchange their partially completed solution with another pair to finish--modifying, addition to, or changing it as the pair deems necessary.

Strategy Design: Choose a problem that requires students to analyze the context in order to determine what it is the problem asks for and what their solution strategy is, preferably one that involves multiple steps. Arrange students in pairs and provide them with the problem. Give pairs 3 to 5 minutes to discuss the problem and collaboratively begin working on the solution. Make sure students know they need to show their work and make their thinking visible so that another pair can follow their strategy but not so much that it doesn't leave room for the other pair to complete it. Then have pairs swap their partially completed problems with another pair. The pairs then continue to pick up from where the other pair left off.



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Assessment Strategy: Open-ended Projects and Problems

DEFINITION:

To better prepare for tests, students should answer with a picture, diagram, or paragraph explaining the solution and how they determined their answers. e.g.,

Topic: Measurement; game: Rabbit Run. Regina has received a pet rabbit from her neighbor Rodney who is about to move to an apartment that does not allow pets. Her father is going to help her build a run for the rabbit in their back yard, but he wants Regina to design it.

Regina sits down to think about the possibilities. Her father says that the run must be rectangular with whole number dimensions. If they want to enclose 48 square feet, how many options do they have?

Resource: Open-ended Math Problems: The Franklin Institute see Online Math Connection

STRATEGIES:

Whiteboarding: Whiteboarding is used in small groups to encourage students to pool their individual thinking and come to a group consensus on an idea or problem-solving approach that is then shared with the teacher and the whole class. The use of whiteboards supports a classroom environment that encourages student-generated ideas and solutions. Researchers have found that when students use whiteboards their discussions are more animated and on task and draw upon higher-level thinking.

Strategy Design: This technique involves using portable 24-by- 32-inch whiteboards or electronic interactive boards to draw and record their ideas and solutions in response to a prompt given by the teacher. Students work collaboratively around the whiteboard to draw and record their ideas and solutions in response to a prompt given by the teacher. Whiteboards can be purchased from suppliers but they are less expensive and a more suitable size when cut from 4-by-8-foot sheets of white economy tile board, available from hardware stores. Use low-odor dry-erase markers (four colors). Example of prompt: Draw and label at least three figures that each have a perimeter of 30 units but have different areas.

Toothpick Puzzles:

Seasonal Problems

Puzzling and Perplexing Problems

Neighborhood Problems

School Yard Geometry

Map Skills



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Assessment Strategy: Oral Reports

DEFINITION:

Any type of student oral presentation to present understanding of math concepts.

See below for specifics on A & D Statements, Agreement Circles, Partner Speaks and Popsicle Questioning strategies.

STRATEGIES:

A & D Statements: Students use A & D Statements to analyze a set of “fact or fiction” statements. In the first part of A & D Statements, students may choose to agree or disagree with a statement or to state that they need more information. In addition, they are asked to describe their thinking about why they agree, disagree, or are unsure. In the second part of the FACT, students describe what they can do to investigate the statement by testing their ideas, examining what is already known, or using other means of mathematical inquiry.

A & D Statements encourage mathematical discussion and argumentation. It is an opportunity for students to practice metacognition (thinking about their own understanding). A & D Statements can be used at the beginning of a learning cycle to elicit students’ ideas about a mathematical topic.

Strategy Design: The teacher selects A & D Statements that focus on specific concepts or procedures that students will encounter in the mathematics curriculum. Develop statements that can launch into mathematical inquiry using manipulatives, learned or invented algorithms and procedures, or use of various information sources. Examine the research on learning to find common errors or misconceptions related to the topic. Use some of these common errors and misconceptions to develop the statements. Students should first be given the opportunity to respond to the statement individually. If they choose disagree or it depends on, ask them to provide an example that refutes the statement or makes the statement true in some cases but not in others.

Then, have students discuss their ideas in small group, coming to consensus on why they agree or disagree with the statement while noting any disagreements among group members.

Agreement Circles: Agreement circles provide a kinesthetic way to activate thinking and engage students in discussing and defending their mathematical ideas.

Strategy Design: Students stand in a large circle as the teacher reads a statement. The students who agree with the statement step to the center of the circle. Those who disagree remain standing on the outside of the circle. Those in the inner circle face their peers still standing around the outside circle and then divide themselves into small groups of students who agree and disagree. The small groups then engage in discussion to defend their thinking. This is repeated with several rounds of statements relating to the same topic, each time with students starting by standing around the large circle.

Partner Speaks: Partner Speaks provides students with an opportunity to talk through a concept or problem solution with another student and receive feedback before sharing with a larger group. When ideas are shared with the larger group, pairs speak from the perspective of their partner’s ideas. This encourages careful listening between student pairs and encourages students to summarize their partner’s thinking so that others can understand.

Strategy Design: Have students turn to their “elbow partner” and provide time for them to take turns discussing

a concept or problem giving feedback on each other’s ideas. For the first time using this strategy, it may be helpful to model for students what it looks and sounds like when two people are engaged in dialogue and when it is appropriate to give feedback. Encourage students to make eye contact and think about what their partner is saying as they respectfully listen without interrupting.

Popsicle Questioning: This strategy is a technique used to selectively choose students for No Hands Questioning. The purpose of this technique is to ensure that certain students, identified in advance by the teacher, are called on during “random” class questioning. Names are written on Popsicle sticks and place in a cup. An inner cup, placed inside the outer cup, holds the Popsicle sticks with the names of students the teacher wants to be sure to call on. The names can be pulled out from the inner cup when needed while giving the appearance that students are all randomly selected when called upon to respond to a question.

Strategy Design: Write all students’ names on the Popsicle sticks and place them in an opaque cup such as a mug. Place another smaller cup inside the larger cup. The names of a few pre-selected students the teacher wants to be sure to call on are placed in the inner cup, which is visible only to the teacher. The other Popsicle sticks are placed outside of the inner cup. When the teacher feels a need to call on a particular student, his or her name is drawn from the inner cup.



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Assessment Strategy: Visual and Virtual Models

DEFINITION:

The application of a visual perception model in virtual reality usually done on a computer.

There are visual models, however, that are not virtual. many options do they have?

Resource: Open-ended Math Problems: The Franklin Institute see Online Math Connection

STRATEGIES:

Student builds a visual model to demonstrate some subject content theme. With the virtual model, the student uses a computer program that most often appears in 3D design. The teacher can view the virtual model and grade according to the detail and creativity of the model as well as its relevance to the mathematical dimensions, topic or theme.



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Assessment Strategy: Diagrams

DEFINITION:

A figure constructed to illustrate a mathematical concept.

STRATEGIES:

Student draws a diagram according to the scale dimensions provided by the teacher. Clear guidelines are given according to the complexity of the project.

